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Charles W. Stewart
Date: October 31, 2003

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re application of

RENE SAMSON

Serial No. 10/009,142 — Group Art Unit: 1764

Filed November 8, 2001 — Examiner: James Arnold Jr.

FLUIDIZED CATALYTIC CRACKING PROCESS — October 31, 2003

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPELLANT'S BRIEF

This is an appeal from the final rejection of claims 1-9.

A. REAL PARTY IN INTEREST

The real party in interest in this appeal is Shell Oil Company who is the assignee of the patent application.

B. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences that will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

C. STATUS OF CLAIMS

Claims 1-9 are pending in this application, and no claims have been cancelled. Claims 1-9 stand rejected pursuant to the Final Office Action of the Examiner mailed July 21, 2003.

Claims 1-9 are the subject of this appeal per Appellant's Notice of Appeal mailed October 21, 2003.

D. STATUS OF AMENDMENTS

There has been no amendment filed subsequent to the Examiner's Final Office Action.

E. SUMMARY OF INVENTION

The inventive process relates to fluidized catalytic cracking. Page 1, lines 1-6; and page 3, lines 17-22. In the process, a hydrocarbon feedstock is contacted with a fluidized particulate catalyst in a reaction zone wherein a hydrocarbon product is prepared and coke accumulates on the catalyst which becomes a spent catalyst. *See supra*. The hydrocarbon product is separated from the spent catalyst by means of one or more gas-solid separation steps. Fig. 1, separation means E; page 3, lines 24-26; page 5, lines 24-27; and page 7, lines 16-26. The spent catalyst is stripped within a dense phase fluidized stripping zone by introducing a stripping medium in the lower portion of the stripping zone. Fig. 1, dense phase stripping zone D; page 3, lines 27-29; page 5, lines 26-29; page 7, lines 26-29; and page 8, lines 1-4. Part of the spent catalyst obtained from the stripping zone is introduced into a regeneration zone wherein the coke is removed from the catalyst by means of combustion. Fig. 1, regeneration zone A; page 3, lines 30-32; page 6, lines 4-6; and page 9, lines 3-16. The remaining part of the spent catalyst obtained from the stripping zone and part of the hot regenerated catalyst obtained from the regeneration zone is introduced into a lower portion of an elongated dilute phase stripping zone. Fig. 1, dilute phase stripping zone B; page 3, line 33 - page 4, line 2; page 6, lines 1-4; and page 9, lines 22-33. A stream of a stripping medium is introduced into the lower portion of the dilute phase stripping zone to contact the resulting mixture of spent catalyst and regenerated catalyst therein. Fig. 1, supply means 10; page 4, lines 3-6; page 6, lines 8-9; and page 9, line 34 - page 10, line 9. A stream of the spent catalyst mixed with the hot regenerated catalyst and stripping medium passes upwardly in the dilute phase stripping zone under dilute phase stripping conditions to an upper portion thereof. Fig. 1, dilute phase stripping zone B; page 4, lines 7-10; page 6, lines 9-11; and page 10, lines 16-30. Substantially all of the spent catalyst and regenerated catalyst from the dilute phase stripping zone effluent is separated and the separated catalyst is introduced into the dense phase stripping zone. Fig. 1, separation means E; page 4, lines 11-14; page 6, lines 9-11; and page 10, line 31 - page 11, line 5. A remaining part of the hot regenerated catalyst obtained from the regeneration zone is passed to the reaction zone to be contacted with the hydrocarbon feedstock. Fig. 1, regeneration zone A; page 4, lines 15-17; page 5, lines 22-24; and page 6, lines 6-8.

The inventive apparatus relates to a fluidized catalytic system. The system comprises a reactor riser (C) having means to receive a hydrocarbon feedstock (14) and regenerated catalyst (2) and optionally a lift gas (1), conduit means (3) to send the reactor effluent to a separation means (E), means (4) to send catalyst from separation means (E) to a dense phase stripping zone (D), means (5) to send a hydrocarbon product as separated from the reactor effluent in separation means (E) to a downstream unit operation, supply means (6) to feed a stripping medium to the dense phase stripping zone (D), means (15) to supply the gaseous effluent of the dense phase stripping zone (D) to separation means (E) in order to separate any catalyst particles present in this gaseous effluent, conduit means (7) to send spent catalyst from dense phase stripping zone (D) to the elongated diluent phase stripping zone (B), conduit means (8) to send spent catalyst from dense phase stripping zone (D) to regeneration zone (A), conduit means (9) to send regenerated catalyst to dilute phase stripping zone (B0, supply means (10) to supply a stripping medium to dilute phase stripping zone (B), conduit means (11) to send the effluent of dilute phase stripping zone (B) to separation means (E), supply means (12) to supply an oxygen containing gas to regeneration zone (A) and conduit means (13) for the combustion gases to leave the regenerator.

F. ISSUES

I. Whether claims 1-5 are unpatentable under 35 USC § 103 as being obvious in view of the Bartholic patent (U.S. 5,584,986).

II. Whether claim 6 is unpatentable under 35 USC § 102 as being anticipated by the Bartholic patent (U.S. 5,584,986).

III. Whether claims 7-9 are unpatentable under 35 USC § 103 as being obvious in view of the Bartholic patent (U.S. 5,584,986).

G. GROUPING OF CLAIMS

The claims that are the subject of this appeal do not stand or fall together.

H. ARGUMENT

I. § 103 Rejection of Claims 1-5 Over the Bartholic Patent

A. The Bartholic Patent

The Bartholic patent discloses a catalytic cracking system and process for circulating, stripping and regenerating a catalyst. Bartholic discloses a reactor where within the bottom thereof is a catalyst stripping section containing a dense phase catalyst. *See* Fig. 1 (reactor 15 and dense phase stripping section 15b) and column 5, lines 19-21, 28-31, and 53-56. Spent catalyst from the bottom of the reactor passes to a dilute phase stripper. *See* Fig. 1 (spent catalyst standpipe 24 and dilute phase stripper 30) and column 5, lines 33-36; column 8, lines

41–48; and introducing step (c) of claims 1 and 21. Hot regenerated catalyst from a catalyst regenerator is mixed with spent catalyst within the bottom of the dilute phase stripper wherein the mixture is fluidized and passes upwardly through the dilute phase stripper to a cyclone separator. *See* Fig. 1 (regenerator 8, and line 11); column 5, lines 36-43; column 6, lines 6-9; column 8, lines 41-54, 63-67; and steps c, d, e and f of claims 1 and 21. The cyclone separator provides for the separation of catalyst from other media with the separated catalyst passing from the cyclone separator to the regenerator. *See* Fig. 1 (cyclone separator 26 and dipleg 9); column 6, lines 6-14; column 8, line 63 – column 9, line 3; and step g of claims 1 and 21.

B. Aspects of the Claimed Process Not Taught by the Bartholic Patent

It is significant that the Bartholic patent fails to teach the introduction of any portion of the catalyst from its dense phase catalyst stripping section directly to the regenerator. Bartholic only shows and describes the passing of catalyst from the dense phase catalyst section of the reactor directly to a dilute phase stripper. No portion of the dense phase catalyst of the Bartholic process passes directly from the reactor to the regenerator. Instead, all of the dense phase catalyst is shown to pass first to the dilute phase stripper in which it is mixed with hot regenerated catalyst from the regenerator and a stripping medium. The spent catalyst from the reactor only passes to the regenerator via the dilute phase stripper and cyclone separator.

It is also significant that the Bartholic patent does not teach that its separated catalyst from its cyclone separators passes to its dense phase stripper. Bartholic shows only that the mixture from its dilute phase stripper is separated with the separated catalyst passing to the regenerator. There is no suggestion that any of the separated catalyst is returned to the reactor or dense phase stripper.

C. Significance of the Differences

Appellant's invention of claim 1 is distinguishable over the Bartholic teachings in that it requires the introduction of part of the spent catalyst from the dense phase stripping zone of its process directly to the regeneration zone. *See* steps b and c of claim 1 and the specification at page 6, lines 1-6. The remaining portion of the spent catalyst from the dense phase stripping zone passes to a dilute phase stripping zone. *See* step d of claim 1 and page 6, lines 1-6.

A further difference between Appellant's claimed invention and the teachings of the Bartholic patent is that claim 1 requires the introduction of the catalyst separated from its dilute phase stripping zone mixture into the dense phase stripping zone of the process. *See* step g of claim 1.

It is the overall combination and arrangement of process steps of Appellant's invention that provide for its particularly significant benefits. Appellant notes that the inventive process

provides for a lower regenerator temperature and higher feed conversion than other prior art processes. *See* the specification at page 4, lines 18-29 and the Examples including page 13, lines14-20. Also indicated is that the inventive process provides for an advantageously higher dense phase stripping zone temperature. *See, e.g.,* the specification at page 8, lines 29-34; page 10 lines 7-11, and page 13, Table 1.

D. Response to Examiner's Arguments

It is respectfully submitted that the Examiner's statement, that the Bartholic patent discloses the introduction of part of the spent catalyst to a regeneration zone and the introduction of the remaining part of the spent catalyst to a dilute phase stripper, is in error. *See* Examiner's Final Action at page 3, last line – page 4, line 3. In fact, as discussed above, the splitting of the spent catalyst is one feature of Appellant's claimed invention that is a significant difference over the teachings of the Bartholic patent, and it is one of the features that provides for unexpected improvements in the operation of catalytic cracking system and process.

The Examiner concedes that the limitations of the dependent claims 2-5 are not disclosed in the Bartholic patent, but only mere assertions are made that these limitations are obvious. There are no citations by the Examiner of secondary art that may be used to supply the features missing from the Bartholic patent but which are recited in Appellant's claims. And, furthermore, the Bartholic patent does not suggest the particular combination and arrangement of process steps as claimed by Appellant, nor does it suggest the further limitations of dependent claims 2-5.

Dependant claim 2 recites an operating temperature of the dense phase stripping zone in the range of from about 500 °C to about 600 °C. One of the benefits provided by Appellant's inventive process is a higher dense phase stripping zone temperature than is provided by other processes. *See* the specification at page 8, line 22 – page 9, line 2; page 10, lines 7-11; and page 13, Table 1. The Examiner, however, argues that the recited temperature range is obvious, because high temperatures are favorable for the stripping process. This argument is circular, and it does not address the real issue as to whether the claimed process as a whole is patentable. As discussed above, there are numerous steps of the claimed process that are not taught by the Bartholic patent. Moreover, the Bartholic patent does not teach the specific combination and arrangement of the process steps as recited in Appellant's claims. And, there certainly is no suggestion in the Bartholic patent that the particularly claimed process provides for a higher dense phase stripping zone temperature.

Dependent claim 3 recites a limitation requiring the spent catalyst from the dense phase stripping zone to be split such that the ratio of the weight of such catalyst passed to the

regenerator to the weight of such catalyst passed to the dilute phase stripping zone is in the range of from about 1:10 to about 10:1. As noted above, the Bartholic patent does not teach the splitting of the spent catalyst and introduction of a portion of the spent catalyst directly to a regenerator and the remaining portion to the dilute phase stripping zone; and therefore, does not recognize any benefit resulting from such a split. The Examiner, however, argues that such a ratio is obvious, because it would be appropriate to utilize the catalyst in any effective ratio in an FCC process. This argument is circular, and it does not address whether the claimed process as a whole is patentable.

Dependent claim 4 recites a limitation requiring the ratio of the weight of spent catalyst obtained from the dense phase stripping zone and the weight of regenerated catalyst obtained from the regenerator introduced into the dilute phase stripping zone to be in the range of from about 1:10 to about 10:1. The Bartholic patent does not teach such a ratio, particularly, in combination with the splitting of the spent catalyst as discussed above and the passing of a separated catalyst from the dilute phase stripping zone directly to the reactor. The Examiner, however, argues that such a ratio is obvious, because it would be appropriate to utilize the catalyst in any effective ratio in an FCC process. This argument is circular, and it does not address whether the claimed process as a whole is patentable. The Bartholic patent does not even remotely suggest this particular ratio in combination with the other features of the claimed invention.

Dependent claim 5 recites the limitation that the catalyst separation step for separating catalyst from the dilute phase stripping zone mixture be conducted within the separation zone used for separating catalyst from the hydrocarbon product. *See also*, the specification at page 10, line 31-page 11, line 5. This has the effect of eliminating the need for separation means distinct from the means for separating hydrocarbon product and spent catalyst. The Examiner makes no comment concerning the obviousness of this particular limitation of dependent claim 5. Dependent claim 5 is patentable for all the same reasons expressed above.

<u>II. § 102 Rejection of Claim 6 Over the Bartholic Patent</u>

The Bartholic patent fails to disclose or teach the use of a conduit means for transferring spent catalyst from a dense phase stripping zone to a regenerator zone. *See* Fig 1 (conduit 8 for transferring spent catalyst from dense phase stripping zone D to regeneration zone A). The Bartholic patent also fails to disclose or teach the use of a conduit means for transferring effluent, containing spent and regenerated catalyst, from a dilute phase stripping zone directly to a separation means for separating catalyst from an effluent of a riser reactor as well as for

separating catalyst from the effluent of the dilute phase stripping zone. *See* Fig 1(conduit 11 for transferring effluent from dilute phase stripping zone B to separation means E).

The above-described differences are sufficient to render claim 6 unanticipated by the Bartholic disclosure.

III. § 103 Rejection of Claims 7-9 over the Bartholic patent

Dependent claim 7 further limits the apparatus of claim 6 by requiring a supply means for providing a feedstock to the lower portion of the dilute phase stripping zone. In view of the fact that the claimed apparatus is not taught, as discussed above, by the Bartholic patent, and in view of the arguments presented above concerning the non-obviousness of the process of claims 1-5, dependent claim 7 is not obvious in view of the Bartholic patent.

Claim 8 is a method of using the apparatus of claim 6, and claim 9 is a method of using the apparatus of claim 7. In view of the fact that the apparatuses of claims 6 and 7 are not taught, as discussed above, by the Bartholic patent, and in view of the arguments presented above concerning the non-obviousness of the process of claims 1-5, the method claims 8 and 9 are not obvious in view of the Bartholic patent.

I. CONCLUSION

In view of the above distinctions and arguments, Appellant respectfully submits that claims 1-9 are patentable over the cited prior art.

Respectfully submitted,

RENE SAMSON

By [signature]

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<u>APPENDIX</u>

1. (Original) Fluidized catalytic cracking process which process comprises contacting a hydrocarbon feedstock with a fluidized particulate catalyst in a reaction zone wherein a hydrocarbon product is prepared and wherein coke accumulates on the catalyst to become a spent catalyst and which process comprises of the following steps:

(a) separating the hydrocarbon product from the spent catalyst by means of one or more gas-solid separation steps;

(b) stripping the spent catalyst in a dense phase fluidized stripping zone by introducing a stripping medium in the lower portion of the stripping zone;

(c) introducing part of the spent catalyst obtained in step (b) to a regeneration zone wherein the coke is removed from the catalyst by means of combustion;

(d) introducing the remaining part of the spent catalyst obtained in step (b) and part of the hot regenerated catalyst obtained in step (c) into a lower portion of an elongated dilute phase stripping zone;

(e) introducing a stream of a stripping medium into the lower portion of the dilute phase stripping zone to contact the resulting mixture of spent catalyst and regenerated catalyst therein;

(f) passing a stream of the spent catalyst mixed with the hot regenerated catalyst and stripping medium upwardly in the dilute phase stripping zone under dilute phase stripping conditions to an upper portion thereof;

(g) separating substantially all of the spent catalyst and regenerated catalyst from the effluent of step (f) and introducing the separated catalyst to the dense phase stripping zone of step (b);

(h) passing the remaining part of the hot regenerated catalyst obtained in step (c) to the reaction zone to be contacted with the hydrocarbon feedstock.

2. (Previously amended) The process of claim 1, in which the temperature in the dense phase stripping zone is between about 500°C and about 600°C.

3. (Previously amended) The process of claim 1, in which the weight ratio of spent catalyst obtained in step (b) which is sent to step (c) and of spent catalyst obtained in step (b) which is used in step (d) is between about 1:10 and about 10:1.

4. (Previously amended) The process of claim 1, in which the weight ratio of spent catalyst and regenerated catalyst in step (d) is between about 1:10 and about 10:1.

5. (Previously amended) The process of claim 1, in which the separation of step (g) is performed in the gas-solid separation steps of step (a).

6. (Original) Fluidized catalytic cracking unit comprising a reactor riser (C) having means to receive a hydrocarbon feedstock (14) and regenerated catalyst (2) and optionally a lift gas (1), a conduit means (3) to send the reactor effluent to a separation means (E), means (4) to send catalyst from separation means (E) to a dense phase stripping zone (D), means (5) to send a hydrocarbon product as separated from the reactor effluent in separation means (E) to a downstream unit operation, supply means (6) to feed a stripping medium to the dense phase stripping zone (D), means (15) to supply the gaseous effluent of the dense phase stripping zone (D) to separation means (E) in order to separate any catalyst particles present in this gaseous effluent, conduit means (7) to send spent catalyst from dense phase stripping zone (D) to the elongated diluent phase stripping zone (B), conduit means (8) to send spent catalyst from dense phase stripping zone (D) to regeneration zone (A), conduit means (9) to send regenerated catalyst to dilute phase stripping zone (B), supply means (10) to supply a stripping medium to dilute phase stripping zone (B), conduit means (11) to send the effluent of dilute phase stripping zone (B) to separation means (E), supply means (12) to supply an oxygen containing gas to regeneration zone (A) and conduit means (13) for the combustion gases to leave the regenerator.

7. (Original) Unit as described in claim 6, wherein additional supply means (16) for introducing a hydrocarbon feedstock are present in the lower portion of the elongated dilute phase stripping zone (B).

8. (Previously amended) A method of using the unit as described in claim 6, said method comprises:

supplying a first hydrocarbon feedstock to said means to receive a hydrocarbon feedstock.

9. (Previously amended) A method of using the unit as described in claim 7, said method comprising:

supplying a second hydrocarbon feedstock to said additional supply means for introducing a hydrocarbon feedstock.

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The inventive apparatus relates to a fluidized catalytic system. The system comprises a reactor riser (C) having means to receive a hydrocarbon feedstock (14) and regenerated catalyst (2) and optionally a lift gas (1), conduit means (3) to send the reactor effluent to a separation means (E), means (4) to send catalyst from separation means (E) to a dense phase stripping zone (D), means (5) to send a hydrocarbon product as separated from the reactor effluent in separation means (E) to a downstream unit operation, supply means (6) to feed a stripping medium to the dense phase stripping zone (D), means (15) to supply the gaseous effluent of the dense phase stripping zone (D) to separation means (E) in order to separate any catalyst particles present in this gaseous effluent, conduit means (7) to send spent catalyst from dense phase stripping zone (D) to the elongated diluent phase stripping zone (B), conduit means (8) to send spent catalyst from dense phase stripping zone (D) to regeneration zone (A), conduit means (9) to send regenerated catalyst to dilute phase stripping zone (B0, supply means (10) to supply a stripping medium to dilute phase stripping zone (B), conduit means (11) to send the effluent of dilute phase stripping zone (B) to separation means (E), supply means (12) to supply an oxygen containing gas to regeneration zone (A) and conduit means (13) for the combustion gases to leave the regenerator.

F. ISSUES

I. Whether claims 1-5 are unpatentable under 35 USC § 103 as being obvious in view of the Bartholic patent (U.S. 5,584,986).

II. Whether claim 6 is unpatentable under 35 USC § 102 as being anticipated by the Bartholic patent (U.S. 5,584,986).

III. Whether claims 7-9 are unpatentable under 35 USC § 103 as being obvious in view of the Bartholic patent (U.S. 5,584,986).

G. GROUPING OF CLAIMS

The claims that are the subject of this appeal do not stand or fall together.

H. ARGUMENT

I. § 103 Rejection of Claims 1-5 Over the Bartholic Patent

A. The Bartholic Patent

The Bartholic patent discloses a catalytic cracking system and process for circulating, stripping and regenerating a catalyst. Bartholic discloses a reactor where within the bottom thereof is a catalyst stripping section containing a dense phase catalyst. *See* Fig. 1 (reactor 15 and dense phase stripping section 15b) and column 5, lines 19-21, 28-31, and 53-56. Spent catalyst from the bottom of the reactor passes to a dilute phase stripper. *See* Fig. 1 (spent catalyst standpipe 24 and dilute phase stripper 30) and column 5, lines 33-36; column 8, lines

41–48; and introducing step (c) of claims 1 and 21. Hot regenerated catalyst from a catalyst regenerator is mixed with spent catalyst within the bottom of the dilute phase stripper wherein the mixture is fluidized and passes upwardly through the dilute phase stripper to a cyclone separator. *See* Fig. 1 (regenerator 8, and line 11); column 5, lines 36-43; column 6, lines 6-9; column 8, lines 41-54, 63-67; and steps c, d, e and f of claims 1 and 21. The cyclone separator provides for the separation of catalyst from other media with the separated catalyst passing from the cyclone separator to the regenerator. *See* Fig. 1 (cyclone separator 26 and dipleg 9); column 6, lines 6-14; column 8, line 63 – column 9, line 3; and step g of claims 1 and 21.

B. Aspects of the Claimed Process Not Taught by the Bartholic Patent

It is significant that the Bartholic patent fails to teach the introduction of any portion of the catalyst from its dense phase catalyst stripping section directly to the regenerator. Bartholic only shows and describes the passing of catalyst from the dense phase catalyst section of the reactor directly to a dilute phase stripper. No portion of the dense phase catalyst of the Bartholic process passes directly from the reactor to the regenerator. Instead, all of the dense phase catalyst is shown to pass first to the dilute phase stripper in which it is mixed with hot regenerated catalyst from the regenerator and a stripping medium. The spent catalyst from the reactor only passes to the regenerator via the dilute phase stripper and cyclone separator.

It is also significant that the Bartholic patent does not teach that its separated catalyst from its cyclone separators passes to its dense phase stripper. Bartholic shows only that the mixture from its dilute phase stripper is separated with the separated catalyst passing to the regenerator. There is no suggestion that any of the separated catalyst is returned to the reactor or dense phase stripper.

C. Significance of the Differences

Appellant's invention of claim 1 is distinguishable over the Bartholic teachings in that it requires the introduction of part of the spent catalyst from the dense phase stripping zone of its process directly to the regeneration zone. *See* steps b and c of claim 1 and the specification at page 6, lines 1-6. The remaining portion of the spent catalyst from the dense phase stripping zone passes to a dilute phase stripping zone. *See* step d of claim 1 and page 6, lines 1-6.

A further difference between Appellant's claimed invention and the teachings of the Bartholic patent is that claim 1 requires the introduction of the catalyst separated from its dilute phase stripping zone mixture into the dense phase stripping zone of the process. *See* step g of claim 1.

It is the overall combination and arrangement of process steps of Appellant's invention that provide for its particularly significant benefits. Appellant notes that the inventive process

provides for a lower regenerator temperature and higher feed conversion than other prior art processes. *See* the specification at page 4, lines 18-29 and the Examples including page 13, lines14-20. Also indicated is that the inventive process provides for an advantageously higher dense phase stripping zone temperature. *See, e.g.,* the specification at page 8, lines 29-34; page 10 lines 7-11, and page 13, Table 1.

D. Response to Examiner's Arguments

It is respectfully submitted that the Examiner's statement, that the Bartholic patent discloses the introduction of part of the spent catalyst to a regeneration zone and the introduction of the remaining part of the spent catalyst to a dilute phase stripper, is in error. *See* Examiner's Final Action at page 3, last line – page 4, line 3. In fact, as discussed above, the splitting of the spent catalyst is one feature of Appellant's claimed invention that is a significant difference over the teachings of the Bartholic patent, and it is one of the features that provides for unexpected improvements in the operation of catalytic cracking system and process.

The Examiner concedes that the limitations of the dependent claims 2-5 are not disclosed in the Bartholic patent, but only mere assertions are made that these limitations are obvious. There are no citations by the Examiner of secondary art that may be used to supply the features missing from the Bartholic patent but which are recited in Appellant's claims. And, furthermore, the Bartholic patent does not suggest the particular combination and arrangement of process steps as claimed by Appellant, nor does it suggest the further limitations of dependent claims 2-5.

Dependant claim 2 recites an operating temperature of the dense phase stripping zone in the range of from about 500 °C to about 600 °C. One of the benefits provided by Appellant's inventive process is a higher dense phase stripping zone temperature than is provided by other processes. *See* the specification at page 8, line 22 – page 9, line 2; page 10, lines 7-11; and page 13, Table 1. The Examiner, however, argues that the recited temperature range is obvious, because high temperatures are favorable for the stripping process. This argument is circular, and it does not address the real issue as to whether the claimed process as a whole is patentable. As discussed above, there are numerous steps of the claimed process that are not taught by the Bartholic patent. Moreover, the Bartholic patent does not teach the specific combination and arrangement of the process steps as recited in Appellant's claims. And, there certainly is no suggestion in the Bartholic patent that the particularly claimed process provides for a higher dense phase stripping zone temperature.

Dependent claim 3 recites a limitation requiring the spent catalyst from the dense phase stripping zone to be split such that the ratio of the weight of such catalyst passed to the

regenerator to the weight of such catalyst passed to the dilute phase stripping zone is in the range of from about 1:10 to about 10:1. As noted above, the Bartholic patent does not teach the splitting of the spent catalyst and introduction of a portion of the spent catalyst directly to a regenerator and the remaining portion to the dilute phase stripping zone; and therefore, does not recognize any benefit resulting from such a split. The Examiner, however, argues that such a ratio is obvious, because it would be appropriate to utilize the catalyst in any effective ratio in an FCC process. This argument is circular, and it does not address whether the claimed process as a whole is patentable.

Dependent claim 4 recites a limitation requiring the ratio of the weight of spent catalyst obtained from the dense phase stripping zone and the weight of regenerated catalyst obtained from the regenerator introduced into the dilute phase stripping zone to be in the range of from about 1:10 to about 10:1. The Bartholic patent does not teach such a ratio, particularly, in combination with the splitting of the spent catalyst as discussed above and the passing of a separated catalyst from the dilute phase stripping zone directly to the reactor. The Examiner, however, argues that such a ratio is obvious, because it would be appropriate to utilize the catalyst in any effective ratio in an FCC process. This argument is circular, and it does not address whether the claimed process as a whole is patentable. The Bartholic patent does not even remotely suggest this particular ratio in combination with the other features of the claimed invention.

Dependent claim 5 recites the limitation that the catalyst separation step for separating catalyst from the dilute phase stripping zone mixture be conducted within the separation zone used for separating catalyst from the hydrocarbon product. *See also*, the specification at page 10, line 31-page 11, line 5. This has the effect of eliminating the need for separation means distinct from the means for separating hydrocarbon product and spent catalyst. The Examiner makes no comment concerning the obviousness of this particular limitation of dependent claim 5. Dependent claim 5 is patentable for all the same reasons expressed above.

II. § 102 Rejection of Claim 6 Over the Bartholic Patent

The Bartholic patent fails to disclose or teach the use of a conduit means for transferring spent catalyst from a dense phase stripping zone to a regenerator zone. *See* Fig 1 (conduit 8 for transferring spent catalyst from dense phase stripping zone D to regeneration zone A). The Bartholic patent also fails to disclose or teach the use of a conduit means for transferring effluent, containing spent and regenerated catalyst, from a dilute phase stripping zone directly to a separation means for separating catalyst from an effluent of a riser reactor as well as for

separating catalyst from the effluent of the dilute phase stripping zone. *See* Fig 1(conduit 11 for transferring effluent from dilute phase stripping zone B to separation means E).

The above-described differences are sufficient to render claim 6 unanticipated by the Bartholic disclosure.

III. § 103 Rejection of Claims 7-9 over the Bartholic patent

Dependent claim 7 further limits the apparatus of claim 6 by requiring a supply means for providing a feedstock to the lower portion of the dilute phase stripping zone. In view of the fact that the claimed apparatus is not taught, as discussed above, by the Bartholic patent, and in view of the arguments presented above concerning the non-obviousness of the process of claims 1-5, dependent claim 7 is not obvious in view of the Bartholic patent.

Claim 8 is a method of using the apparatus of claim 6, and claim 9 is a method of using the apparatus of claim 7. In view of the fact that the apparatuses of claims 6 and 7 are not taught, as discussed above, by the Bartholic patent, and in view of the arguments presented above concerning the non-obviousness of the process of claims 1-5, the method claims 8 and 9 are not obvious in view of the Bartholic patent.

I. CONCLUSION

In view of the above distinctions and arguments, Appellant respectfully submits that claims 1-9 are patentable over the cited prior art.

Respectfully submitted,

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APPENDIX

1. (Original) Fluidized catalytic cracking process which process comprises contacting a hydrocarbon feedstock with a fluidized particulate catalyst in a reaction zone wherein a hydrocarbon product is prepared and wherein coke accumulates on the catalyst to become a spent catalyst and which process comprises of the following steps:

(a) separating the hydrocarbon product from the spent catalyst by means of one or more gas-solid separation steps;

(b) stripping the spent catalyst in a dense phase fluidized stripping zone by introducing a stripping medium in the lower portion of the stripping zone;

(c) introducing part of the spent catalyst obtained in step (b) to a regeneration zone wherein the coke is removed from the catalyst by means of combustion;

(d) introducing the remaining part of the spent catalyst obtained in step (b) and part of the hot regenerated catalyst obtained in step (c) into a lower portion of an elongated dilute phase stripping zone;

(e) introducing a stream of a stripping medium into the lower portion of the dilute phase stripping zone to contact the resulting mixture of spent catalyst and regenerated catalyst therein;

(f) passing a stream of the spent catalyst mixed with the hot regenerated catalyst and stripping medium upwardly in the dilute phase stripping zone under dilute phase stripping conditions to an upper portion thereof;

(g) separating substantially all of the spent catalyst and regenerated catalyst from the effluent of step (f) and introducing the separated catalyst to the dense phase stripping zone of step (b);

(h) passing the remaining part of the hot regenerated catalyst obtained in step (c) to the reaction zone to be contacted with the hydrocarbon feedstock.

2. (Previously amended) The process of claim 1, in which the temperature in the dense phase stripping zone is between about 500°C and about 600°C.

3. (Previously amended) The process of claim 1, in which the weight ratio of spent catalyst obtained in step (b) which is sent to step (c) and of spent catalyst obtained in step (b) which is used in step (d) is between about 1:10 and about 10:1.

4. (Previously amended) The process of claim 1, in which the weight ratio of spent catalyst and regenerated catalyst in step (d) is between about 1:10 and about 10:1.

5. (Previously amended) The process of claim 1, in which the separation of step (g) is performed in the gas-solid separation steps of step (a).

6. (Original) Fluidized catalytic cracking unit comprising a reactor riser (C) having means to receive a hydrocarbon feedstock (14) and regenerated catalyst (2) and optionally a lift gas (1), a conduit means (3) to send the reactor effluent to a separation means (E), means (4) to send catalyst from separation means (E) to a dense phase stripping zone (D), means (5) to send a hydrocarbon product as separated from the reactor effluent in separation means (E) to a downstream unit operation, supply means (6) to feed a stripping medium to the dense phase stripping zone (D), means (15) to supply the gaseous effluent of the dense phase stripping zone (D) to separation means (E) in order to separate any catalyst particles present in this gaseous effluent, conduit means (7) to send spent catalyst from dense phase stripping zone (D) to the elongated diluent phase stripping zone (B), conduit means (8) to send spent catalyst from dense phase stripping zone (D) to regeneration zone (A), conduit means (9) to send regenerated catalyst to dilute phase stripping zone (B), supply means (10) to supply a stripping medium to dilute phase stripping zone (B), conduit means (11) to send the effluent of dilute phase stripping zone (B) to separation means (E), supply means (12) to supply an oxygen containing gas to regeneration zone (A) and conduit means (13) for the combustion gases to leave the regenerator.

7. (Original) Unit as described in claim 6, wherein additional supply means (16) for introducing a hydrocarbon feedstock are present in the lower portion of the elongated dilute phase stripping zone (B).

8. (Previously amended) A method of using the unit as described in claim 6, said method comprises:

supplying a first hydrocarbon feedstock to said means to receive a hydrocarbon feedstock.

9. (Previously amended) A method of using the unit as described in claim 7, said method comprising:

supplying a second hydrocarbon feedstock to said additional supply means for introducing a hydrocarbon feedstock.